

# ENE 101 – Introduction to Energy Engineering

## WEEK 4

### Energy engineering discipline:

- **Energy Engineering**

Energy Engineering is a broad field of engineering dealing with energy efficiency, energy services, facility management, plant engineering, environmental compliance and alternative energy technologies. It is one of the more recent engineering disciplines to emerge. It combines knowledge from the fields of physics, math, and chemistry with economic and environmental engineering practices. Prepares the student to tackle the complex energy-related problems faced by society.

- Energy engineers apply their skills to increase efficiency and further develop renewable sources of energy.
- The main job of energy engineers is to find the most efficient and sustainable ways to operate buildings and manufacturing processes.
- Energy engineers audit the use of energy in those processes and suggest ways to improve the systems. This means suggesting *advanced lighting, better insulation, more efficient heating and cooling properties of buildings.*

- **Job Opportunities**

There are many job opportunities for students who major in Energy Engineering, especially in green energy. Companies are hiring Energy Engineers, Clean Energy Specialists, Energy Conservation Engineers, Energy Efficiency Engineers, Energy Systems Engineers, Solar Energy Specialists, etc.

Employment fields will include Renewable Energy, Photovoltaic Engineering, Waste Management and Recycling, Oil and Gas Production, Fuels Engineering, Energy Systems, Energy Generation, Energy Storage, Energy Transmission, and Energy Consumption, etc. both domestic and global. Some of these jobs may not require a master's or Ph.D.

- **Energy Engineering Courses**

Development of efficient and sustainable energy technologies is necessary for taking the next big step in renewable energy usage. For example, in our university, Energy Engineering Department, the first year courses are shown in below:

1. Sınıf / 1. Yarıyıl							
Dersin Kodu	Dersin Adı	Türü	Kuramsal	Uygulama	Toplam saat	Ulusal	AKTS
CHM 101	General Chemistry I (Genel Kimya I)	Z	3	2	5	4	6
PHY 121	Physics I (Fizik I)	Z	3	2	5	4	6
MTH 101	Calculus I (Matematik I)	Z	4	2	6	5	7
CHM 103	General Chemistry Lab. (Genel Kimya Lab.)	Z	0	4	4	2	3
ENE 101	Introduction to Energy Engineering (Enerji Mühendisliğine Giriş)	Z	1	0	1	1	2
ENE 103	Technical Drawing (Teknik Resim)	Z	1	2	3	2	3
OUL 101	Orientation to University Life (Üniversite Yaşamına Uyum)	Z	0	0	0	0	0
TUR 101	Turkish I (Türk Dili I)	Z	2	0	2	2	1
HIS 101	Atatürk Principles and History of Revolution I (Atatürk İlkeleri ve İnkılapları Tarihi I)	Z	2	0	2	2	1
ENG 101	Development of Reading and Writing Skills in English I (İngilizce Okuma ve Yazma Becerisinin Geliştirilmesi I)	Z	2	0	2	2	1
<b>Toplam</b>					<b>30</b>	<b>24</b>	<b>30</b>

1. Sınıf / 2. Yarıyıl							
Dersin Kodu	Dersin Adı	Türü	Kuramsal	Uygulama	Toplam saat	Ulusal	AKTS
CHM 102	General Chemistry II (Genel Kimya II)	Z	2	2	4	3	5
PHY 122	Physics II (Fizik II)	Z	3	2	5	4	6
MTH 102	Calculus II (Matematik II)	Z	4	2	6	5	7
ENE 102	Computer Programming (Bilgisayar Programlama)	Z	3	2	5	4	5
PHY 172	General Physics Lab. (Genel Fizik Lab.)	Z	0	4	4	2	4
TUR 102	Turkish II (Türk Dili II)	Z	2	0	2	2	1
HIS 102	Atatürk Principles and History of Revolution II (Atatürk İlkeleri ve İnkılapları Tarihi II)	Z	2	0	2	2	1
ENG 102	Development of Reading and Writing Skills in English II (İngilizce Okuma ve Yazma Becerisinin Geliştirilmesi II)	Z	2	0	2	2	1
<b>Toplam</b>					<b>30</b>	<b>24</b>	<b>30</b>

- **Qualifications**

To become an energy engineer you need to have an engineering or scientific-related degree. Relevant subjects include;

- ✚ earth sciences;
- ✚ electrical, mechanical or chemical engineering;

- ✚ environmental engineering;
- ✚ environmental science and management;
- ✚ mining or petroleum engineering;
- ✚ renewable or sustainable energy.

- **Turkey in Energy Sector**

Turkey's ambitious vision for 2023, envisages especially interesting targets for the renewable part of the energy sector. These targets include:

- ✚ 34,000 MW capacity of hydro power plants;
- ✚ 20,000 MW capacity of wind power plants;
- ✚ Minimum 5000 MW of solar power plants;
- ✚ Minimum 1000 MWe geothermal energy; and
- ✚ 1000 MWe installed capacity for Biomass energy.

Turkey's primary target was even then to increase share of renewable energy resources for electricity generation at least to 30 percent by year 2023.

- **Where stands Turkey now?**

As of end of August 2015, Turkey has **71,858 MW** electricity generations installed capacity.

**23643 MW** of total installed capacity consists of generating facilities utilizing **hydraulic resources**,

**4053 MW** of total installed capacity consists of generating facilities utilizing **wind energy resources**,

**524 MW** of total installed capacity consists of generating facilities utilizing **geothermal energy resources**,

**317 MW** of total installed capacity consists of generating facilities utilizing **biomass energy resources** and waste heat, and

**155 MW** of total installed capacity consists of generating facilities utilizing **solar energy resources**.

As end of January 2015, generating facilities utilizing renewable energy resources constitutes 41% of total installed capacity.

As end of year 2013, electricity consumption is approximately 246356 GWh and approximately 28% of this consumption is fulfilled by renewable energy resources. Approximate contribution of renewable energy resources group is 68980 GWh, which is formed by 86% hydraulic resources (59420 GWh), 11% wind resources (7557 GWh), 2% geothermal resources (1363 GWh), and rest is biomass resources (1171 GWh).

- **Turkey's potential**

- ✚ According to various resources Turkey has following minimum technical renewable energy potentials;
- ✚ 160000 GWh/year economic hydraulic capacity
- ✚ 48000 MW/year wind energy capacity
- ✚ 1500 kWh/m<sup>2</sup>-year average global solar radiation
- ✚ 31500 MWt geothermal capacity
- ✚ 8.6 MTOE biomass potential
- ✚ 1.5-2 MTOE biogas potential

**References:**

1. Renewable Energy Turkey, October 2015. Prepared by Derya Kaplan. (<https://www.rvo.nl/sites/default/files/2015/10/Renewable%20Energy%20Turkey.pdf>)
2. <http://engineeringscience.berkeley.edu/energy-engineering/>