ENE425 Sustainable Energy and App Development

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Chapter 1

Frame: Green economy, sustainable energy and sustainable development

This chapter frames the content of the course by discussing key concepts as **green economy**, **sustainable energy** and **sustainable development**. We only provide and overview of those concepts. We will explore in detail the concepts of sustainable energy and sustainable development and their relationship in chapters 3 and 4. This chapter is based in McCormick et al. (2015).

1.1 Green economy concept

From an economic point of view, a "green economy" implies using taxes, subsidies and fees in a strategic and systematic way.

The term "green economy" is based on multiple conceptual grounds. In fact green economy as a concept has evolved from, and been influenced by, many different schools of economic thought. This section provides a brief overview of how the concept has evolved.

The green economy concept is not new, but it became popular outside of academic circles right after the 2008-2009 global financial crisis.

The economic downturn that followed encouraged numerous pledges to reform current economic systems towards a path much less damaging to society, the environment and the financial system itself. As a result, numerous countries implemented green economy stimulus packages to reinvigorate production and consumption, particularly in the short term. At the time, the available definition of green economy was provided by UNEP. In its simplest expression, UNEP has argued that **"a green economy is low-carbon, resource efficient and socially inclusive"**.

The question remains - what does a green economy really entail? As mentioned earlier, conceptual choices about a green economy can cover a **wide spectrum**,

- from larger aspects of sustainability
- to narrow concerns about environmental pollution.

However, there also seems to be consensus about what a **green economy** should incorporate; and this points to

- job creation,
- poverty alleviation,

- reduction of greenhouse gas emissions,
- investments in natural capital and ecosystem services,
- improvements in social equity and human well-being,
- and also increases in resource efficiency.

For more information about the green economy watch the video: Green Economy - a film by Yann Arthus-Bertrand.

The term "green economy" is based on multiple conceptual grounds.

1. **Agricultural economics.** This was done during the so-called "Green Revolution" in agriculture that occurred between 1940 and 1970.

   At that time, agricultural economists were studying and analysing the issues that the "Green Revolution" brought to this economic sector, and they used the term green economy to refer to the positive impacts that **research and technology** development had on agricultural productivity.

2. **Welfare economics.** This school of economics is concerned with the effects of economic activities on welfare or well-being.

   From a general point of view, welfare or well-being is often understood as the state of being healthy, happy, or prosperous; either as individuals or as a group.

   Welfare economics also provides the basis for the **"market failure"** concept, which can be simply understood as the idea that if incorrect price signals are sent, market economies fail to achieve efficiency.

   Another aspect that is also captured by both welfare economics and the term green economy is **economic inequality**, that is, the uneven distribution of income and wealth.

3. **Natural resource economics.** This school of economics deals basically with the supply, demand, and distribution of renewable and depletable resources.

   A key objective for natural resources economics is to find ways **to manage resources efficiently and sustainably** so that they are available to future generations. In principle, a green economy should guarantee the capacity of natural capital that provides resources and environmental services in the long run.

4. **Environmental economics.** For environmental economists pollution is understood as a **negative externality**, take air pollution for example. If an economic activity is reducing air quality, the health or welfare of a third party may suffer as a consequence.

   Environmental economists attribute this to the absence of prices for environmental assets like clean air, biodiversity and clean water.

   Relying on the idea of sustainable development and also on the theory, the methods and the policy options provided by environmental and natural resource economics, Pearce, Markandya and Barbier framed the term green economy in the late 1990s around **technology innovation, resource efficiency natural capital, ecological risks and human development**.

5. **Energy economics** focuses on how the economic system can pursue growth by bringing together economic, environmental, social, and technological aspects through the expansion of clean energy production, distribution and consumption. Lately, there has been growing attention to the term "green energy economy."

6. **Ecological economics**, where priority is given to **sustainability and the economy as a subsystem of the ecosystem**.

   For instance aspects of ecological scarcity and social equity included in the green economy term have also been put forward by ecological economics.

   There is a growing body of knowledge that shows the rapid loss of ecosystems services. This situation has encouraged investment in and conservation of natural capital, which is also a critical aspect for the modern interpretation of the term green economy.

   Conventional or neoclassical economics, according to ecological economists, does not reflect adequately the value of essential factors such as clean air and water, species diversity, or social and generational equity. To address this, ecological economists advocate a transdisciplinary approach.

Find out more about ecological economics: Interview with Robert Costanza (link)

1.2 Sustainable Energy

Sustainable energy is energy produced and used in such a way that it "meets the needs of the present without compromising the ability of future generations to meet their own needs." (Kutscher, 2019). It is similar to the concepts of green energy and clean energy in its consideration of environmental impacts, however formal definitions of sustainable energy also include economic and social impacts.

We will study the concept of sustainable energy and we will study the relation between **sustainable energy** and **sustainable development** in chapter 3.

For more information about sustainable energy visit: Sustainable energy (wikipedia).

For more information about sustainable development visit: Sustainable Development (wikipedia).

1.3 Bibliography

Kutscher, C. F., 2019, "Principles of sustainable energy systems," *Boca Raton, FL: CRC Press,* Chapter 1.

McCormick, K., Richter, J. L., and Pantzar, M., 2015, "Greening the Economy Compendium," *Lund University.*