

BE103 INTRODUCTION TO SUSTAINABLE ENGINEERING



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Expected Outcome of this Course

The student will be

- ▶ Able to understand the different types of environmental pollution problems and their sustainable solutions.
- ▶ Able to work in the area of sustainability for research and education.
- ▶ Having a broader perspective in thinking for sustainable practices by utilizing the engineering knowledge and principles gained from this course.

What is Sustainability ?

- ▶ “Meeting society’s present needs without compromising the ability of **future generations** to meet their own needs”. (Brundtland Report in 1987)

Sustainability

- ▶ Triple bottom line (people, profits and planet)“
- ▶ "Preserve today to determine tomorrow"
- ▶ "Meeting both present and future needs"

Need and Concept of Sustainability

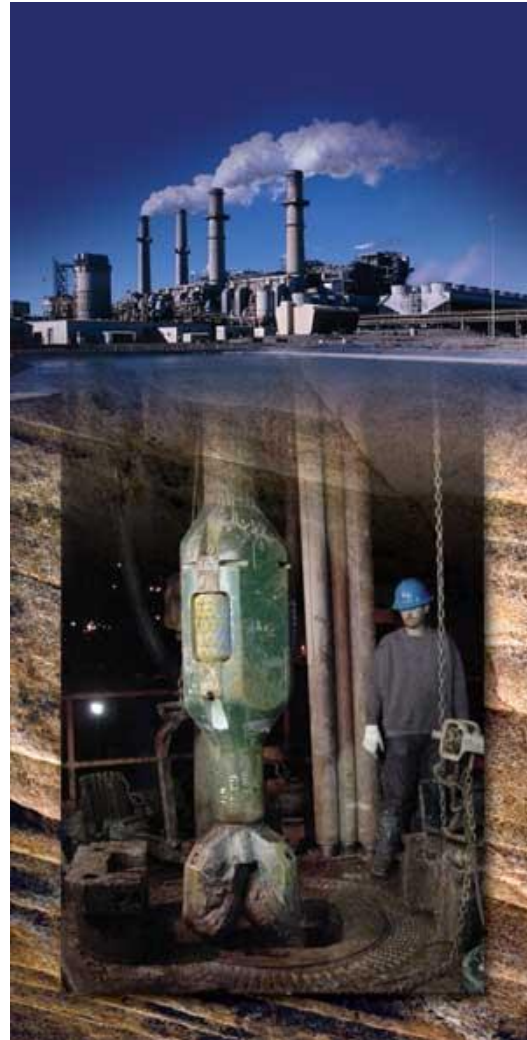
- ▶ Greatest challenge today is providing every individual on the planet, access to safe, clean and sustainable energy supplies.
- ▶ Sustainability requires **conservation of resources, minimizing depletion of non renewable resources and using sustainable practices for managing renewable resources.**
- ▶ People should work together in large ways and small to achieve sustainability.

- ▶ Energy production, transportation, construction and other industries have large responsibilities to find methods for using resources in a sustainable manner.

Yes!, We are part of the problem



We are an integral part of the solution as well



We are an integral part of the solution
as well



Asst. Prof. Vishnu Sankar, DME, RSEI



Courtesy Dan Saurinér

Traditional Engineering Design vs Sustainable Engineering Design

- ▶ Function
- ▶ Cost
- ▶ Safety

Plus

Impact on people (Society)

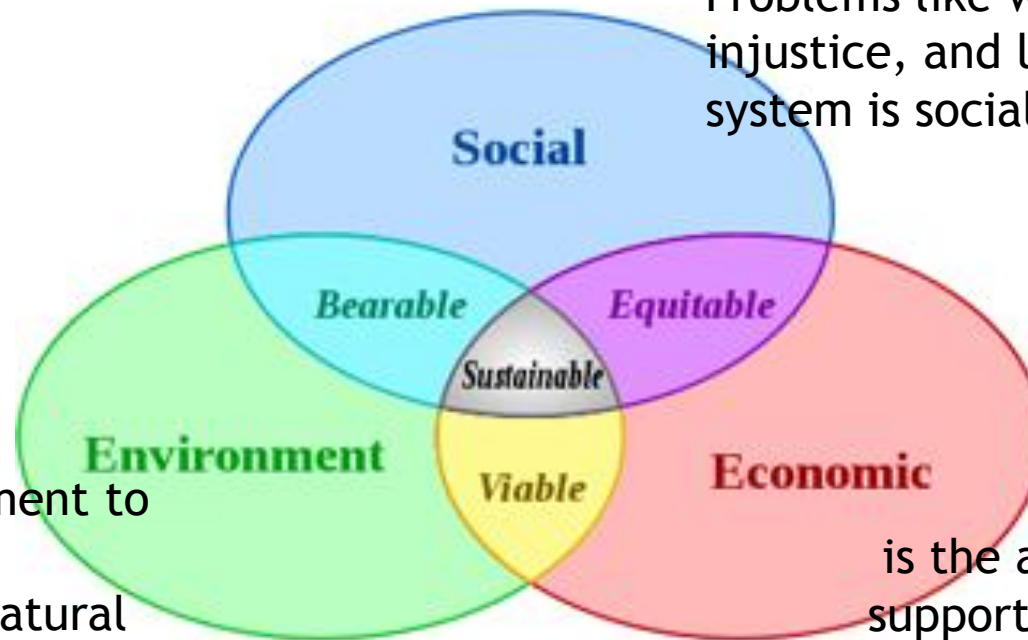
Impact on the Planet (Environment)

Social, Environmental and Economic Aspects of Sustainability

- ▶ Sustainable development means improving the quality of human life while living within the carrying capacity of supporting ecosystems.
- ▶ Brundtland formulation of sustainability focus on inter-generational equity.
- ▶ Intra-national and inter-national equity also is a concern.

Social, Environmental and Economic Aspects of Sustainability

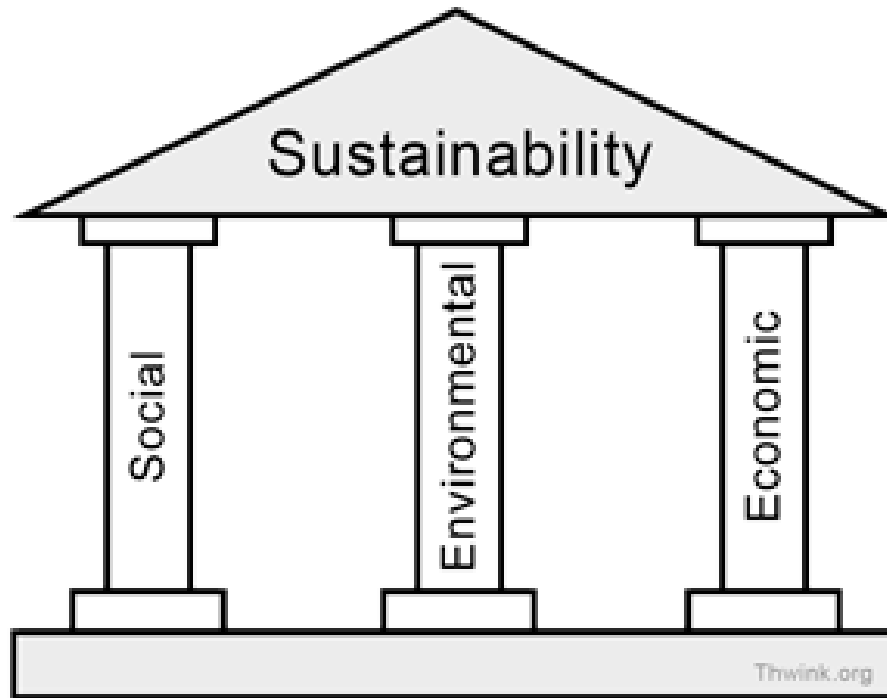
is the ability of a social system, such as a country, family, or organization, to function at a defined level of social well being and harmony indefinitely. Problems like war, endemic poverty, widespread injustice, and low education rates are symptoms a system is socially unsustainable.



is the ability of the environment to support a defined level of environmental quality and natural resource extraction rates indefinitely.

is the ability of an economy to support a defined level of economic production indefinitely.

3 pillars of Sustainability



Social Aspects of sustainability

- ▶ Lessening of poverty
- ▶ Health and education status of the community
- ▶ Adequate job opportunities
- ▶ Protection of rights
- ▶ Equitable access to resources
- ▶ Elimination of gender inequality

Economic Aspects

- ▶ The expenditure and revenue generation
- ▶ Steady and sufficient food availability in an economic way
- ▶ Economic use of raw materials
- ▶ Economic production patterns
- ▶ Steady rate of productivity

Environmental Aspects

- ▶ Prudent exploitation of natural resources so that it can be used for a longer period.
- ▶ For non renewable find substitutes
- ▶ For renewable, give time to replenish
- ▶ Minimize the impact on the environment during waste disposal.

Questions for future engineers to ask about their designs:

- ▶ Will it be made from recycled materials?
- ▶ How much energy will it use?
- ▶ Will it be powered by a battery or solar cells?
- ▶ Will it be able to be recycled at the end of its useful life?
- ▶ Will it have parts that contain toxic metals that must be disposed of?

